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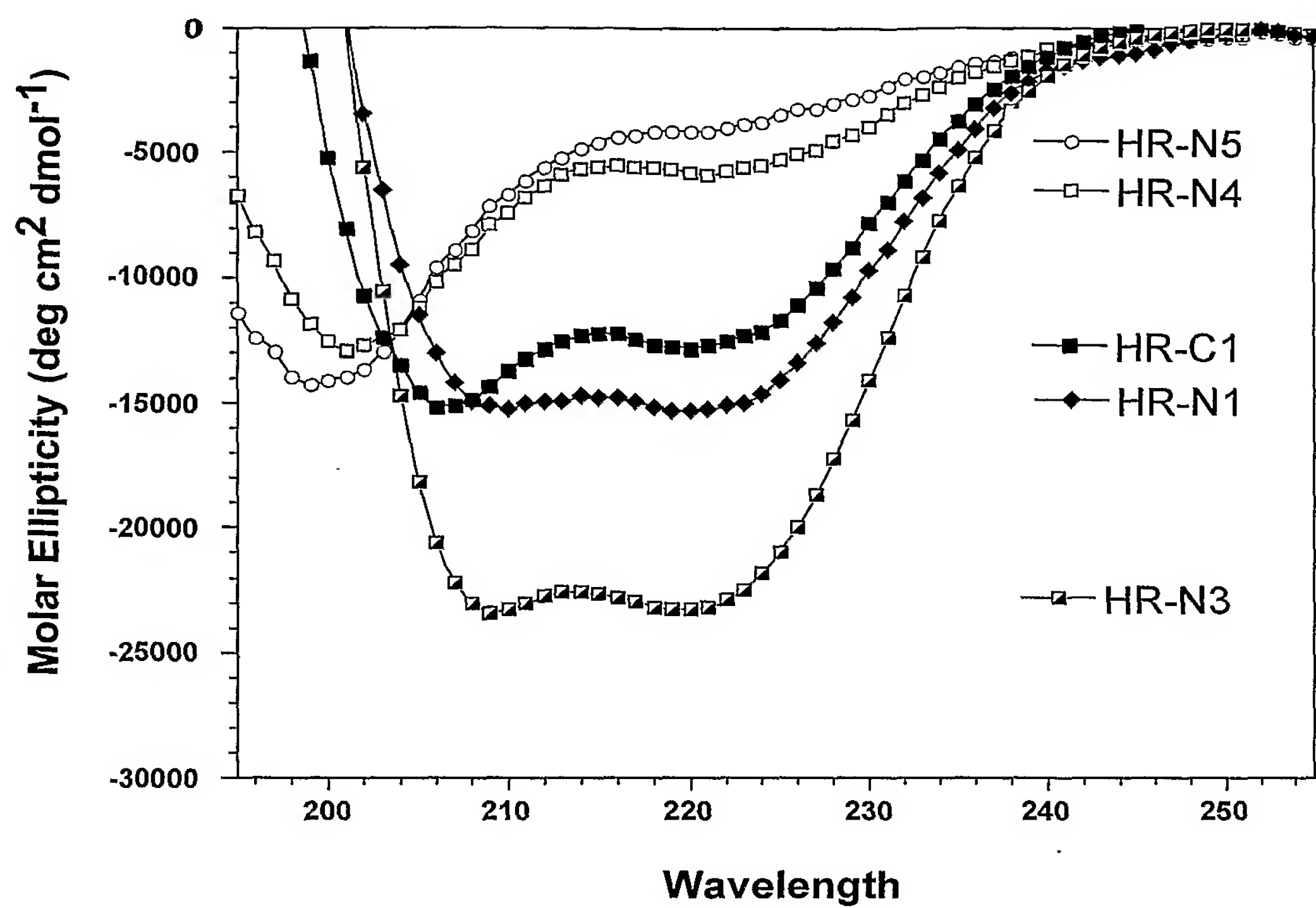
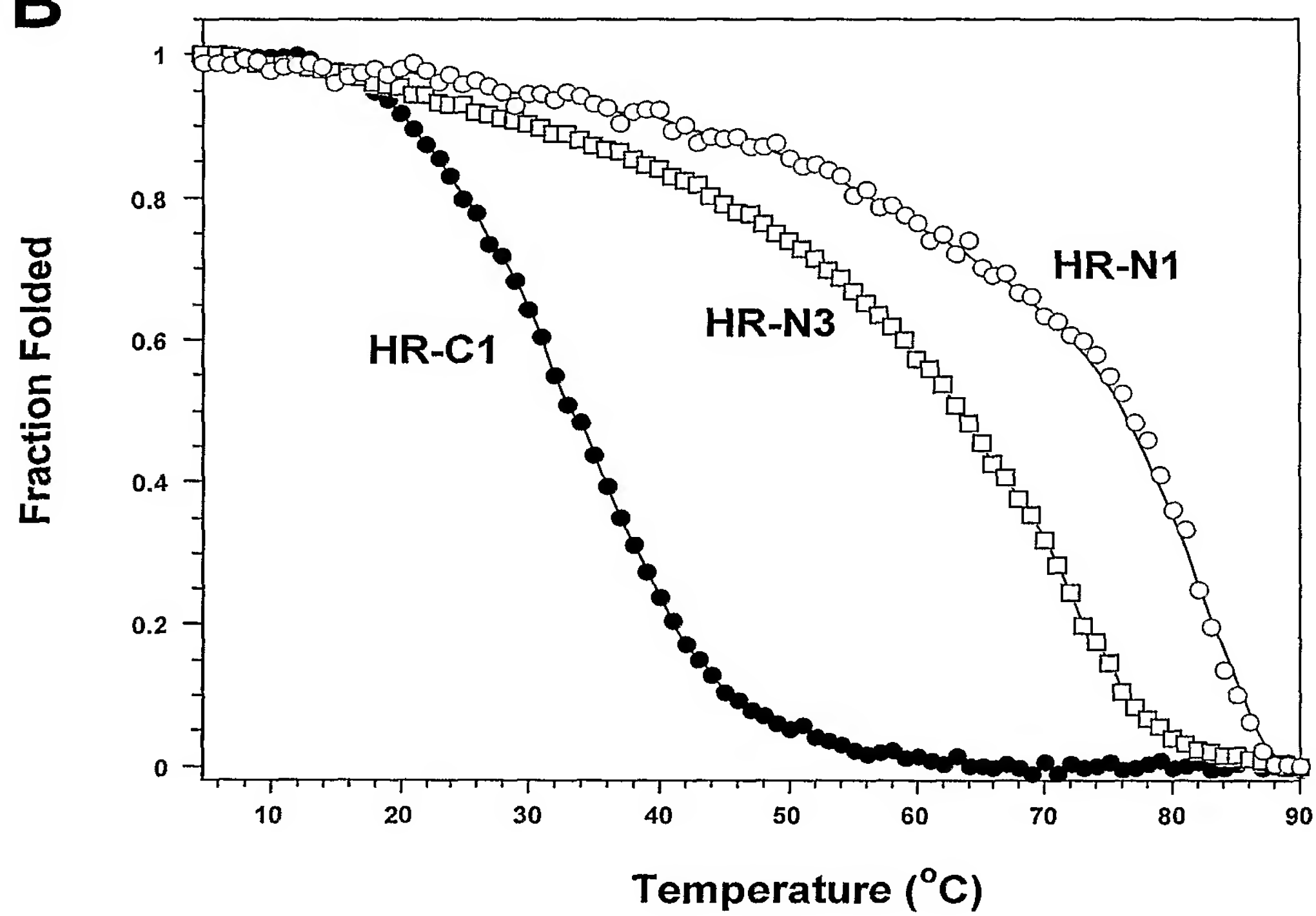
**A****B**

FIG. 3

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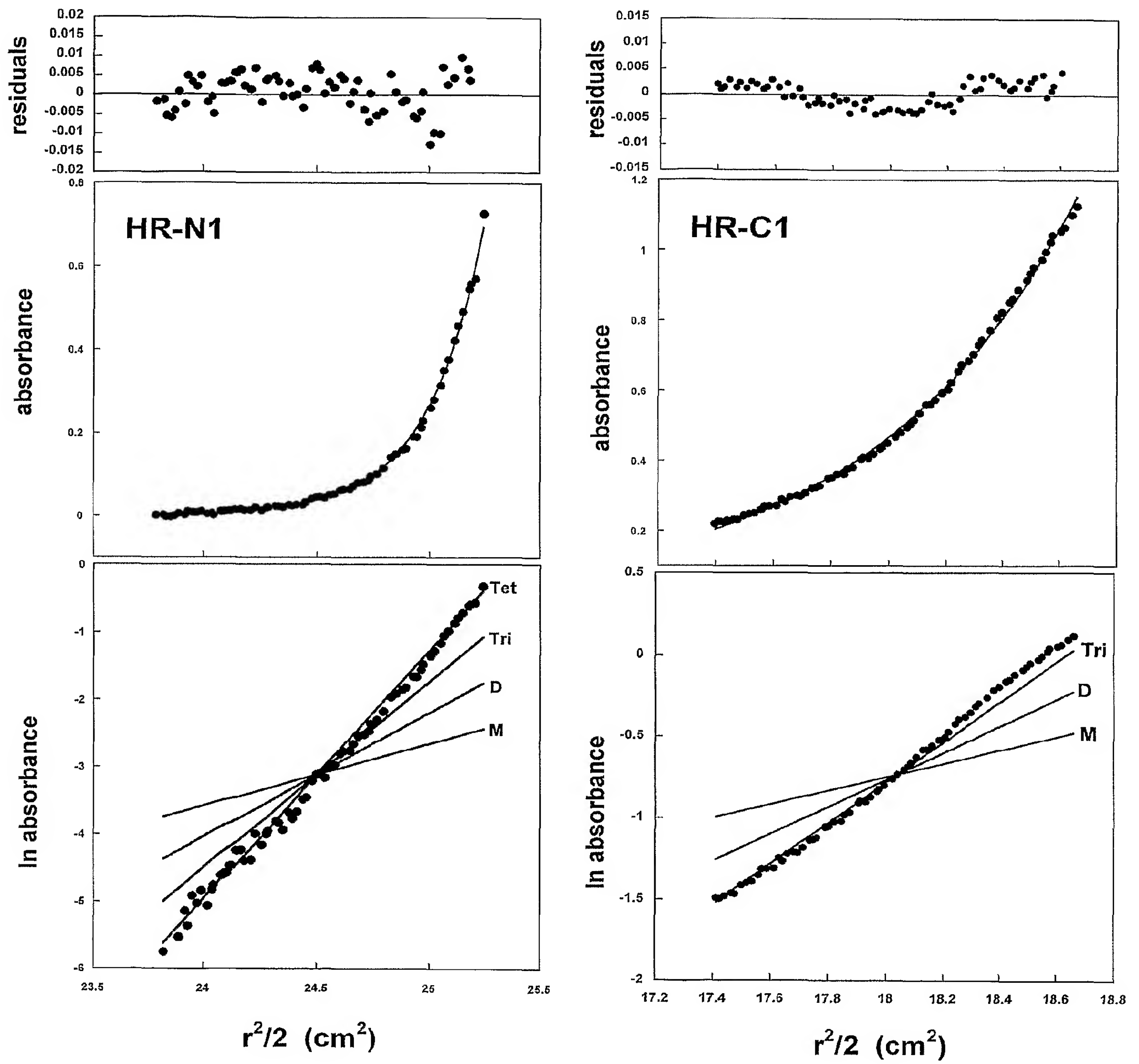


FIG. 4

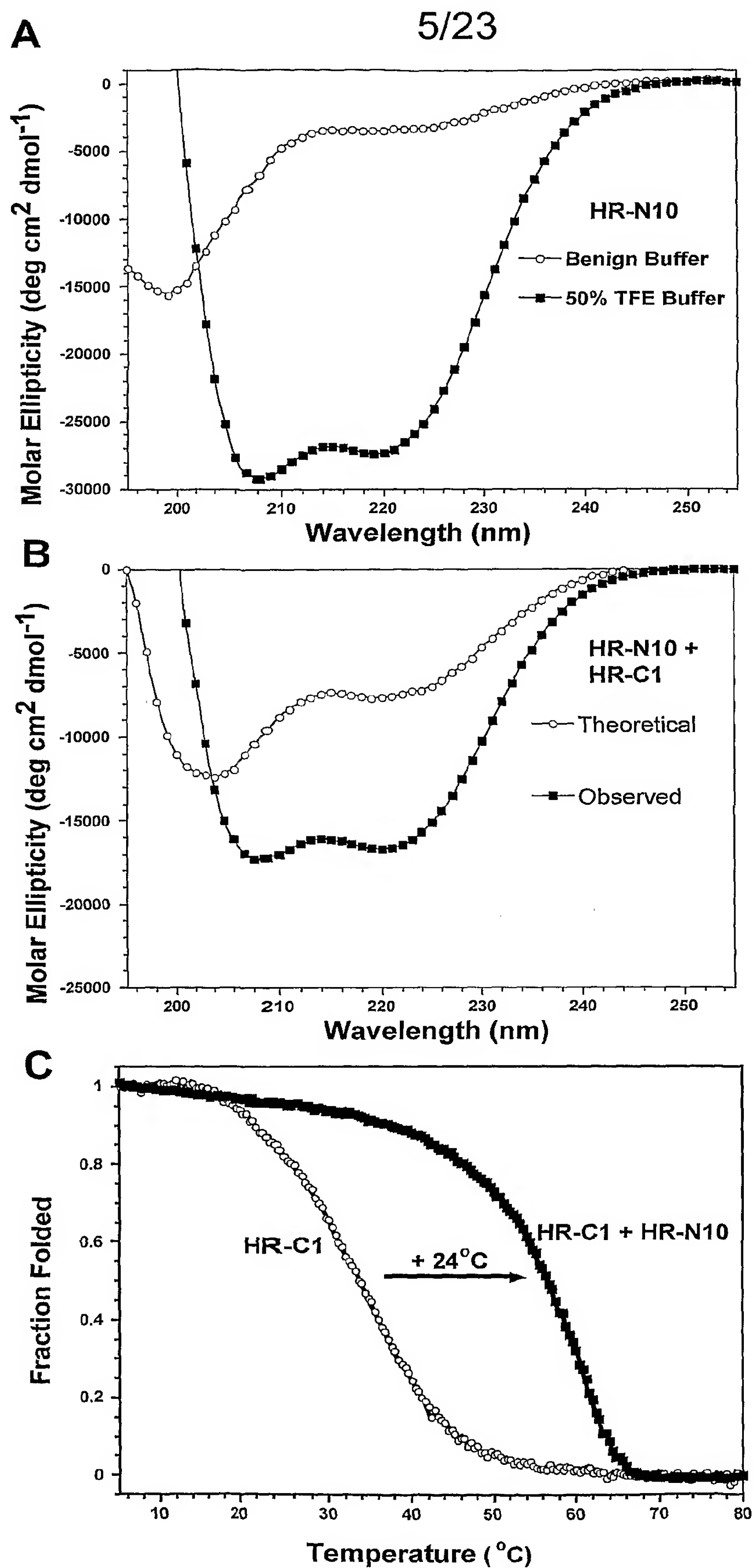


FIG. 5

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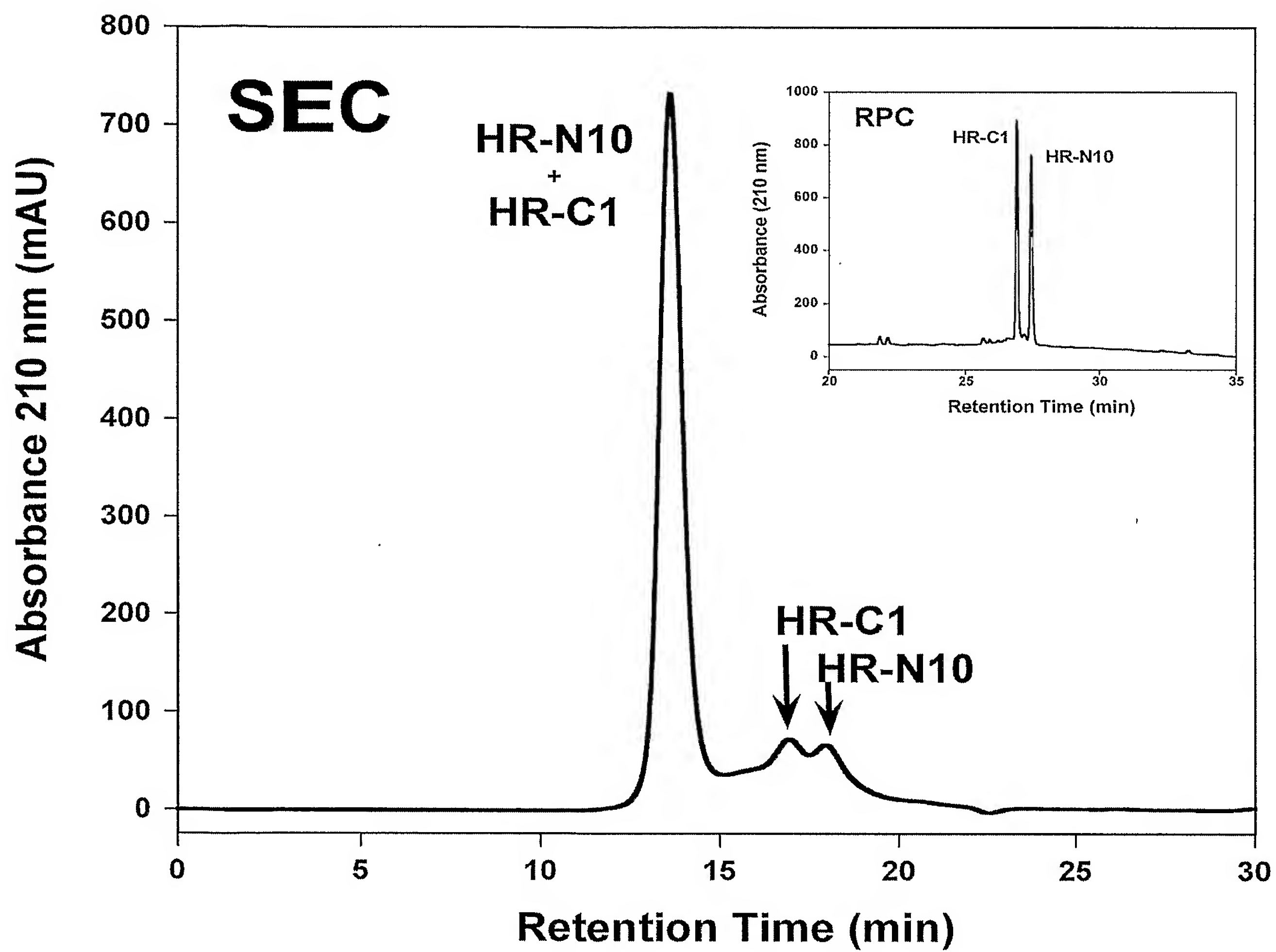


FIG. 6

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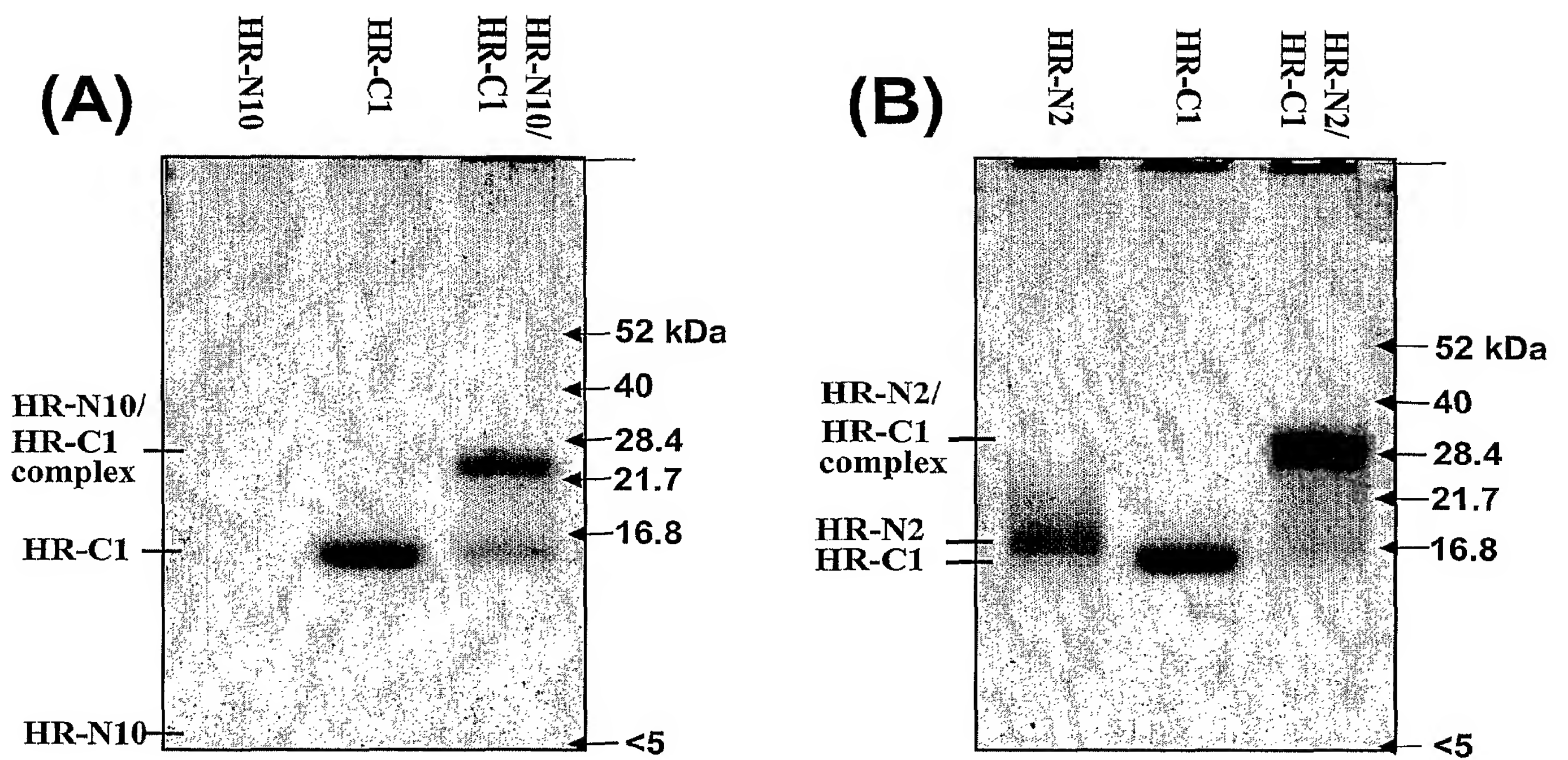


FIG. 7

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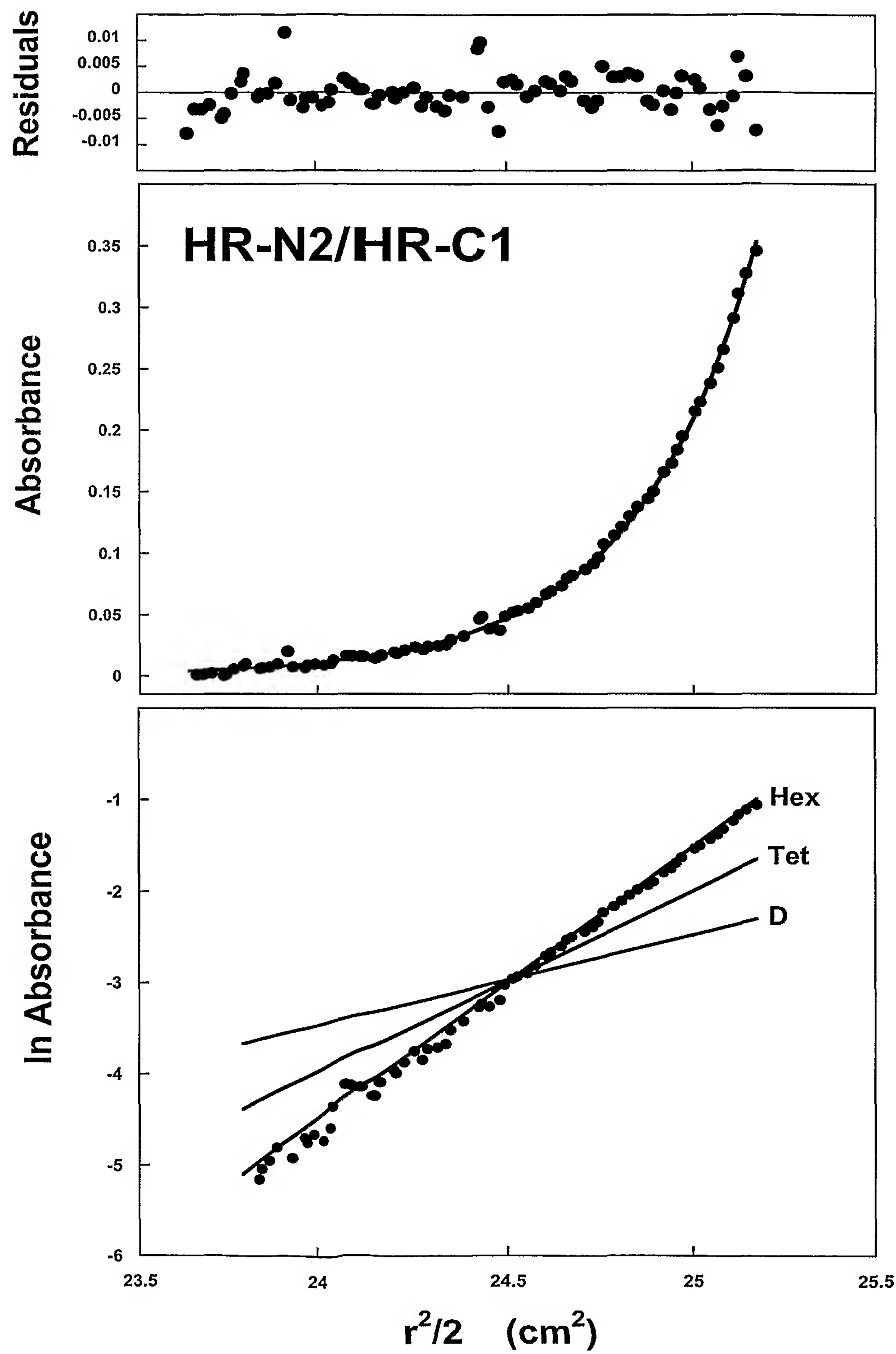


FIG. 8



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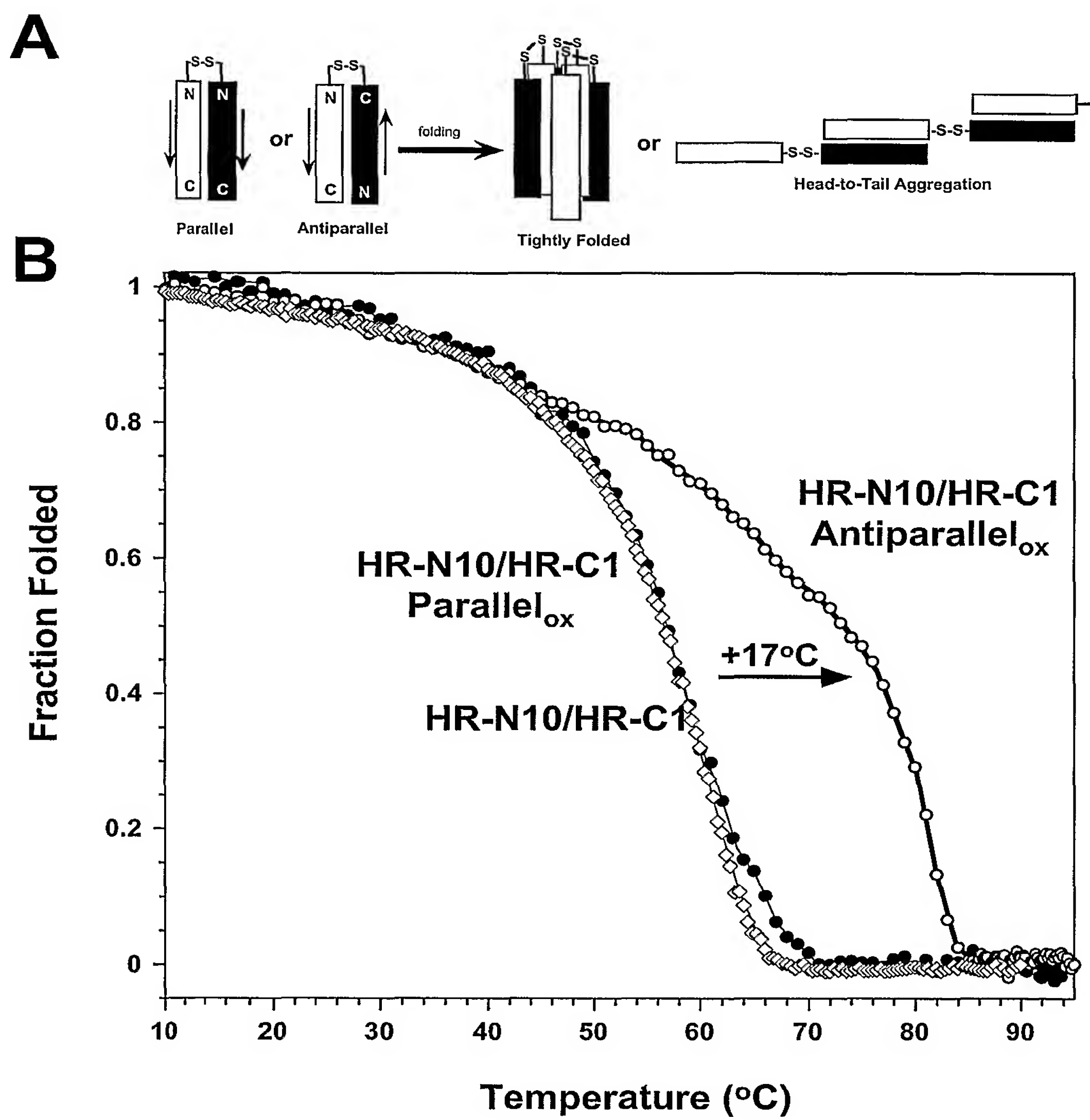


FIG. 9

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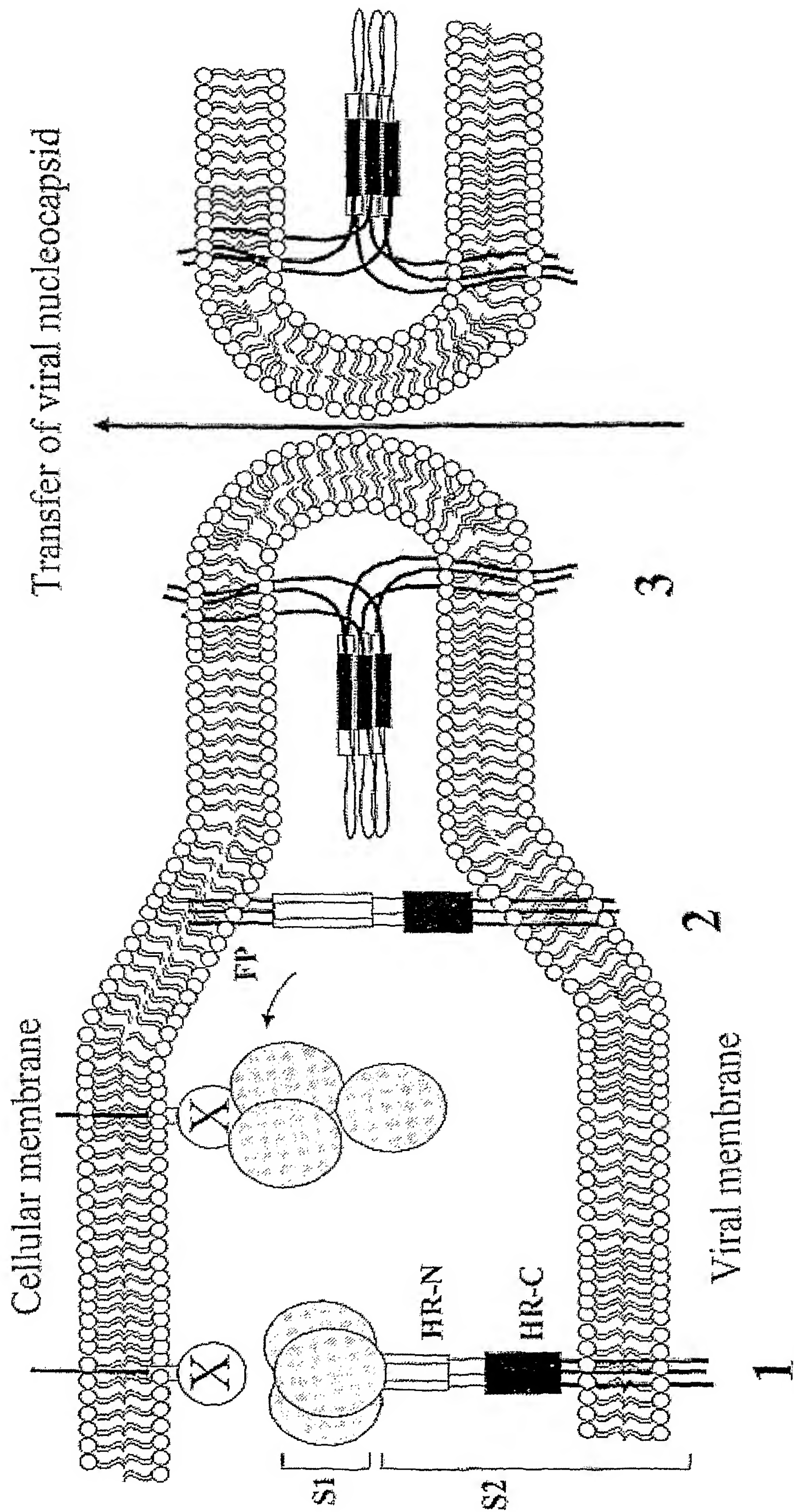


FIG. 10

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HR-N (916-950)

(native)

Ac-IQESLTTTSTALGKLQDVVNQNAQALNTLVKQLSS-amide

(Ala, Lys and Arg substituted)

Ac-IQAALTKTSAALGKLQAAVNRNAAALNKLVKALSS-amide

(Aib=B substituted)

Ac-IQESLTBTSTALGKLQDVVNBNAQALNBLVKQLSS-amide

(Dxg=Z substituted)

Ac-IQESLTZTSTALGKLQDVVNZNAQALNZLVKQLSS-amide

HR-C (1151-1185)

(native)

Ac-ISGINASVVNIQKEIDRLNEVAKNLNESLIDLQEL-amide

(Ala, Lys and Arg substituted)

Ac-IAAINKSVAAIQKEIARLNEVAKALNASLIRLQAL-amide

(Aib=B substituted)

Ac-ISGINBSVVNIQKEIDRLNBVAKNLNBSLIDLQEL-amide

(Dxg=Z substituted)

Ac-ISGINZSVVNIQKEIDRLNZVAKNLNZSLIDLQEL-amide

FIG. 11

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## HR-N (916-950)

Ac-IQESLTTTSTALGKLQDVVNQNAQALNTLVKQLSS-amide

## 1 i,i+4 lactam bridge

Ac-IQESLTTTSTALGKLQEVVNKNAQALNTLVKQLSS-amide  


## 2 i,i+4 lactam bridge

Ac-IQESLTETSTKLGKLQDVVNQNAQALNELVKKLSS-amide  


## 1 i,i+7 bridge

Ac-IQESLTTTSTALGELQDVVNENAQALNTLVKQLSS-amide  



## HR-C (1151-1185)

Ac-ISGINASVVNIQKEIDRLNEVAKNLNESLIDLQEL-amide

## 1 i,i+4 lactam bridge

Ac-ISGINASVVNIQKEIERLNKVAKNLNESLIDLQEL-amide  


## 2 i,i+4 lactam bridge

Ac-ISGINESVVKIQKEIDRLNEVAKNLNESLIKLQEL-amide  


## 1 i,i+7 bridge

Ac-ISGINASVVNIQEEIDRLNEVAKNLNESLIDLQEL-amide  
 = covalent bond

FIG. 12

**HR-N (916-950)**

Ac-IQESLTTTSTALGKLQDVVNQNAQALNTLVKQLSS-amide

(Ile and Leu substituted into the hydrophobic core)

Ac-IIESLTTTITALGKLIDVLNQNIQALNTLIKQLSS-amide

**HR-C (1151-1185)**

Ac-ISGINASVVNIQKEIDRLNEVAKNLNESLIDLQEL-amide

(Ile substituted into the hydrophobic core)

Ac-ISGINASIVNIQKEIDRLNEVIKNLNESLIDLQEL-amide

**FIG. 13**

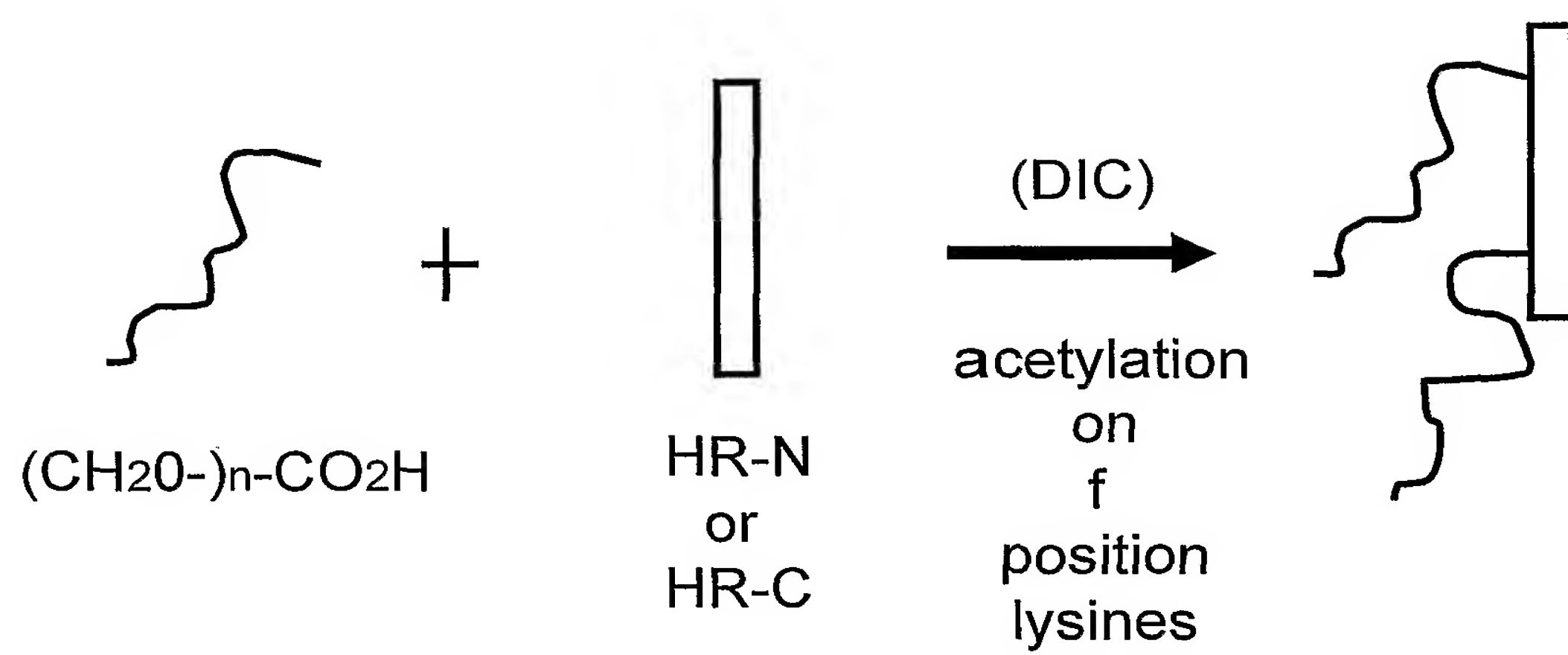


FIG. 14

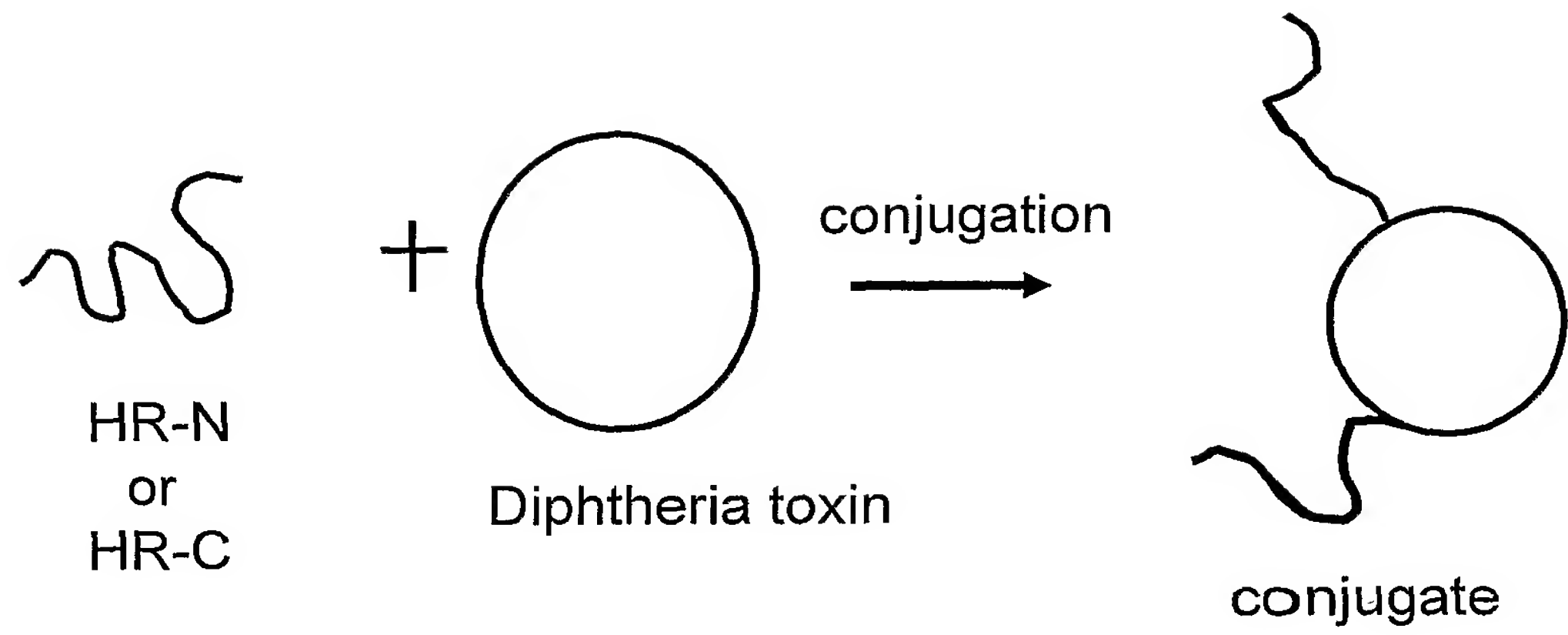


FIG. 15

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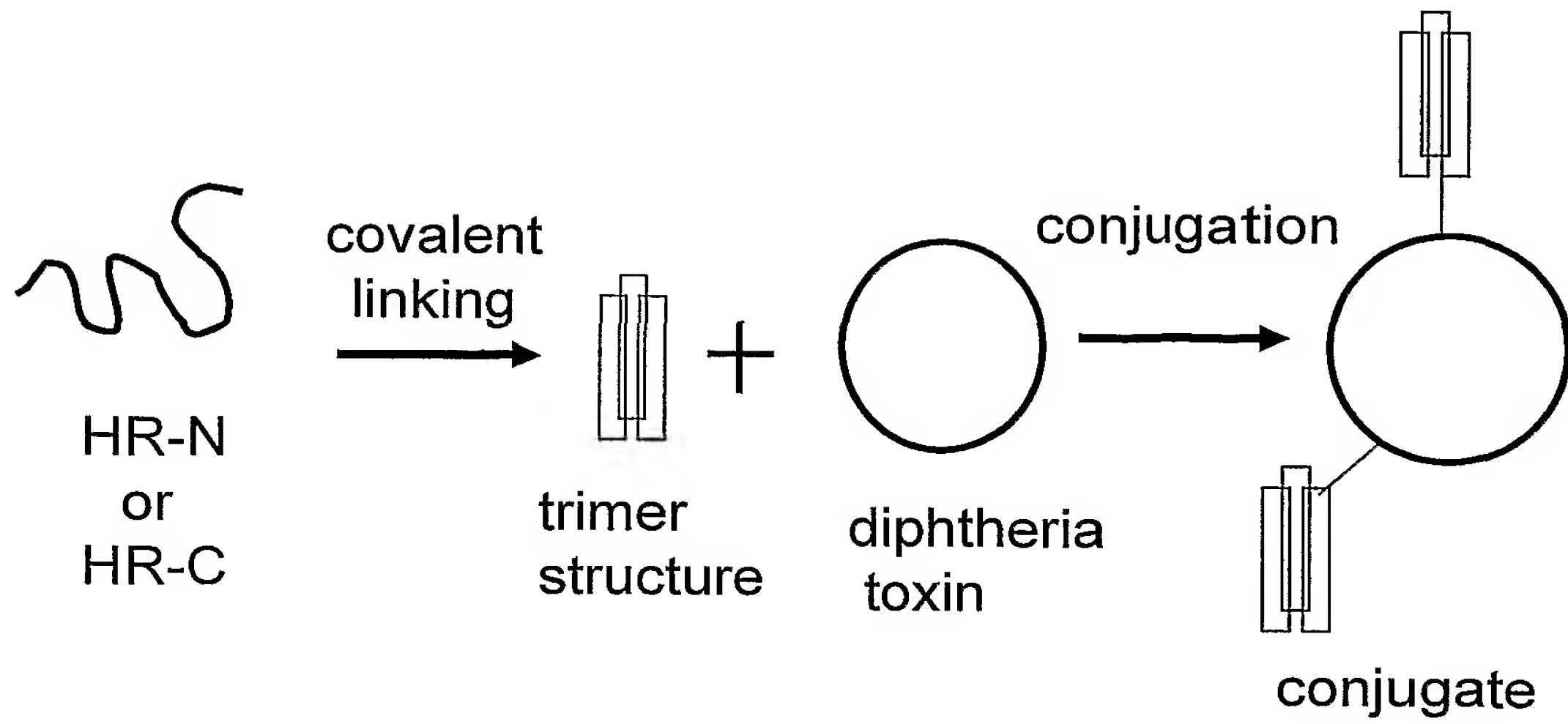


FIG. 16A

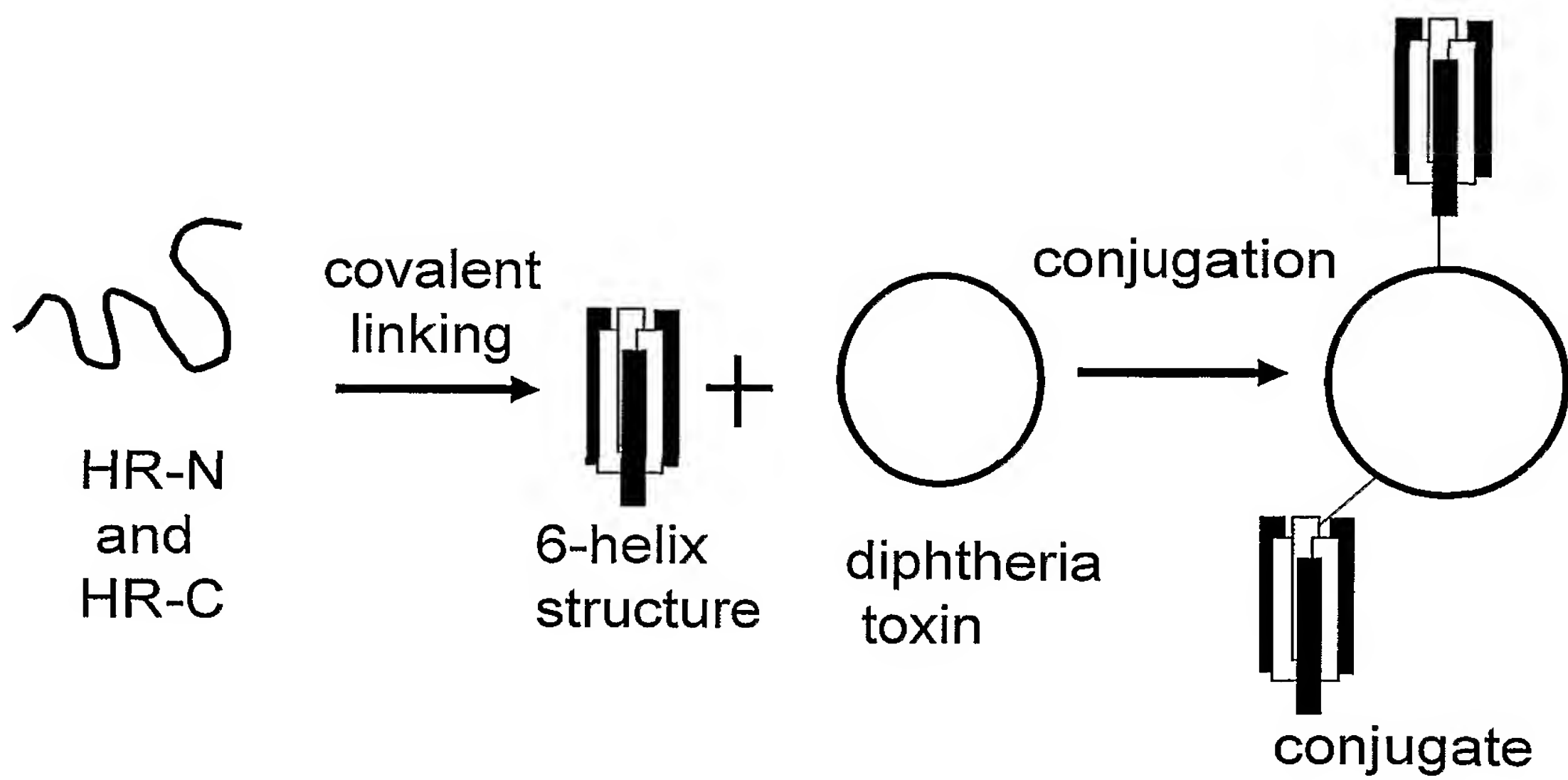
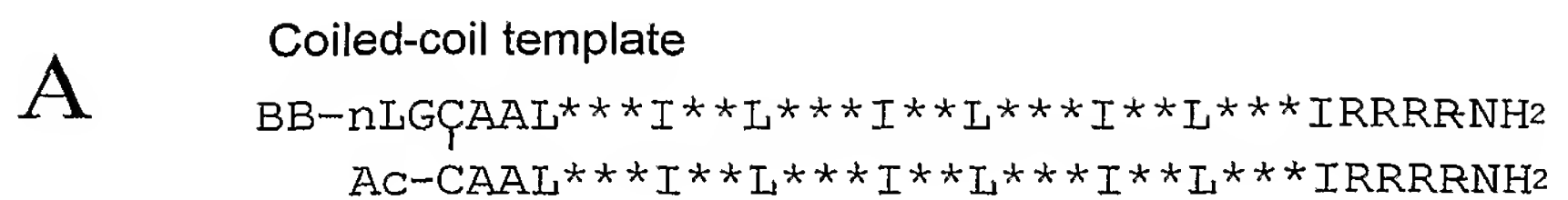


FIG. 16B



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HR-N and HR-C sequences incorporated into the template

HR-N(920-945) CAALTTTITALGKLIDVLNQNIQALNTLIRRNR-amide

HR-C(1161-1186) CAALQKEIDRLNEVIKLNLESIIDLQELIRRNR-amide

**B** General outline of the experimental procedures used to prepare the template-carrier protein conjugates for immunization

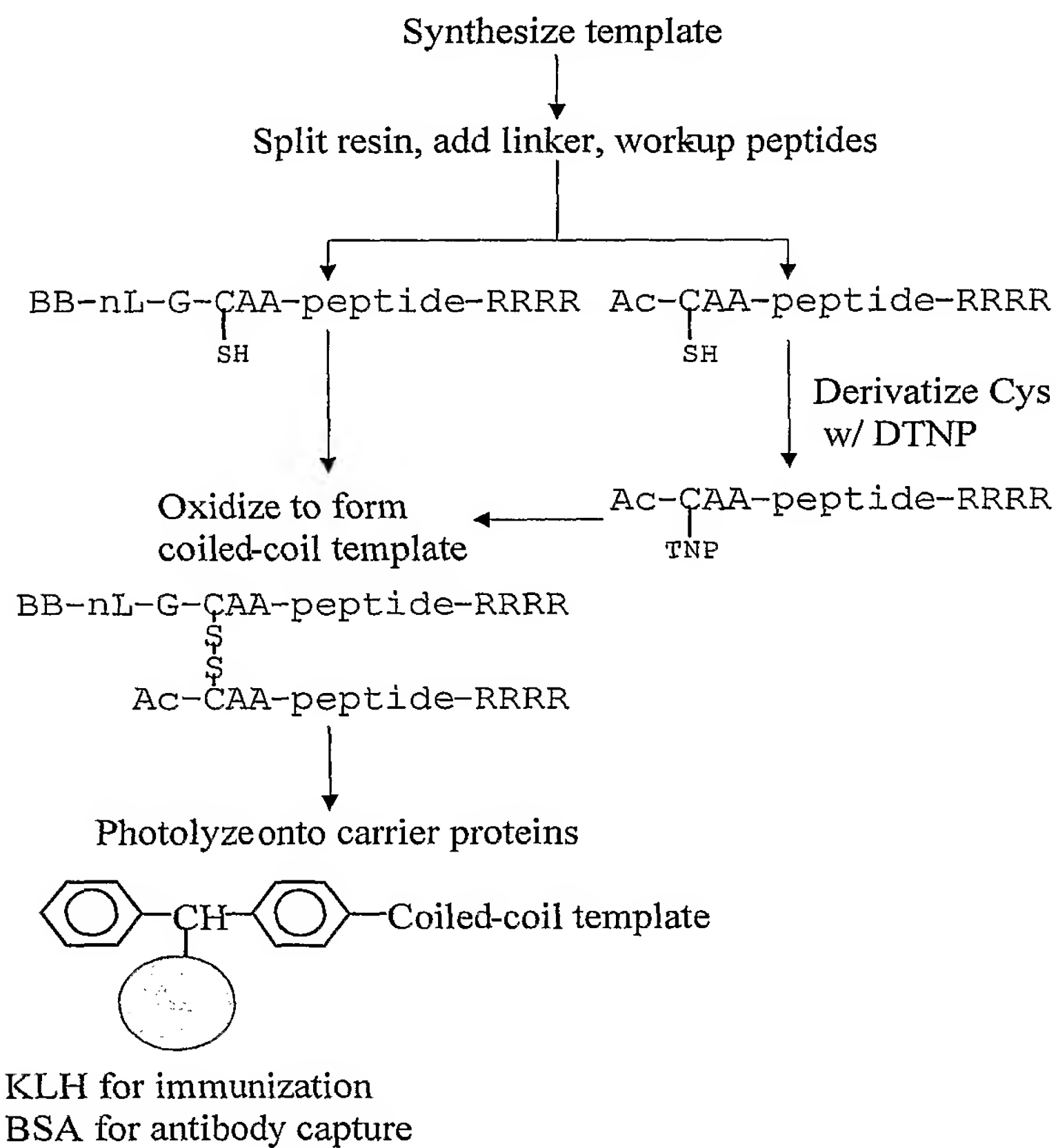


FIG. 17

HR-N peptides, HR-N1 to HR-N17.

Nucleotide sequences for SARS peptides. The amino acid region is shown in brackets.

**HR-N1 (882-973)**

ATGCAAATGGCATATAGGTTCAATGGCATTGGAGTTACCCAAAATGTTCTCTATGAGAACCA  
AAAACAAATCGCCAACCAATTTAACAAGGCGATTAGTCAAATTCAGAATCACTTACAACAA  
CATCAACTGCATTGGGCAAGCTGCAAGACGTTGTTAACCAGAATGCTCAAGCATTAAACACA  
CTTGTTAAACAACCTTAGCTCTAATTTTGGTGCAATTTCAAGTGTGCTAAATGATATCCTTTC  
GCGACTTGATAAAGTCGAGGCGGAGGTA

**HR-N2 (916-973)**

ATTCAAGAATCACTTACAACAACATCAACTGCATTGGGCAAGCTGCAAGACGTTGTTAACCA  
GAATGCTCAAGCATTAAACACACTTGTTAAACAACCTTAGCTCTAATTTTGGTGCAATTTCAA  
GTGTGCTAAATGATATCCTTTCGCGACTTGATAAAGTCGAGGCGGAGGTA

**HR-N3 (927-973)**

TTGGGCAAGCTGCAAGACGTTGTTAACCAGAATGCTCAAGCATTAAACACACTTGTTAAACA  
ACTTAGCTCTAATTTTGGTGCAATTTCAAGTGTGCTAAATGATATCCTTTCGCGACTTGATA  
AAGTCGAGGCGGAGGTA

**HR-N4 (974-1011)**

CAAATTGACAGGTTAATTACAGGCAGACTTCAAAGCCTTCAAACCTATGTAACACAACAACCT  
AATCAGGGGCTGCTGAAATCAGGGCTTCTGCTAATCTTGCTGCTACTAAAATG

**HR-N5 (882-916)**

ATGCAAATGGCATATAGGTTCAATGGCATTGGAGTTACCCAAAATGTTCTCTATGAGAACCA  
AAAACAAATCGCCAACCAATTTAACAAGGCGATTAGTCAAATT

**HR-N6 (888-922)**

TTCAATGGCATTGGAGTTACCCAAAATGTTCTCTATGAGAACCAAAAACAAATCGCCAACCA  
ATTTAACAAGGCGATTAGTCAAATTCAAGAATCACTTACAACA

**HR-N7 (895-929)**

CAAATGTTCTCTATGAGAACCAAAAACAAATCGCCAACCAATTTAACAAGGCGATTAGTCA  
AATTCAGAATCACTTACAACAACATCAACTGCATTGGGCAAG

FIG. 18A

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**HR-N8 (902-936)**

CAAAAACAAATCGCCAACCAATTTAACAAGGCGATTAGTCAAATTCAGAATCACTTACAAC  
AACATCAACTGCATTGGGCAAGCTGCAAGACGTTGTTAACCAG

**HR-N9 (909-943)**

TTTAACAAGGCGATTAGTCAAATTCAGAATCACTTACAACAACATCAACTGCATTGGGCAA  
GCTGCAAGACGTTGTTAACCAGAATGCTCAAGCATTAACACA

**HR-N10 (916-950)**

ATTCAGAATCACTTACAACAACATCAACTGCATTGGGCAAGCTGCAAGACGTTGTTAACCA  
GAATGCTCAAGCATTAACACACTTGTTAAACAACCTTAGCTCT

**HR-N11 (923-957)**

ACATCAACTGCATTGGGCAAGCTGCAAGACGTTGTTAACCAGAATGCTCAAGCATTAACAC  
ACTTGTTAAACAACCTTAGCTCTAATTTTGGTGCAATTTCAAGT

**HR-N12 (931-965)**

CAAGACGTTGTTAACCAGAATGCTCAAGCATTAACACACTTGTTAAACAACCTTAGCTCTAA  
TTTTGGTGCAATTTCAAGTGTGCTAAATGATATCCTTTTCGCGA

**HR-N13 (938-972)**

GCTCAAGCATTAACACACTTGTTAAACAACCTTAGCTCTAATTTTGGTGCAATTTCAAGTGT  
GCTAAATGATATCCTTTTCGCGACTTGATAAAGTCGAGGCGGAG

**HR-N14 (945-979)**

GTAAACAACCTTAGCTCTAATTTTGGTGCAATTTCAAGTGTGCTAAATGATATCCTTTTCGCG  
ACTTGATAAAGTCGAGGCGGAGGTACAAATTGACAGGTTAATT

**HR-N15 (952-986)**

TTTGGTGCAATTTCAAGTGTGCTAAATGATATCCTTTTCGCGACTTGATAAAGTCGAGGCGGA  
GGTACAAATTGACAGGTTAATTACAGGCAGACTTCAAAGCCTT

**HR-N16 (959-993)**

CTAAATGATATCCTTTTCGCGACTTGATAAAGTCGAGGCGGAGGTACAAATTGACAGGTTAAT  
TACAGGCAGACTTCAAAGCCTTCAAACCTATGTAACACAACAA

**HR-N17 (966-1000)**

CTTGATAAAGTCGAGGCGGAGGTACAAATTGACAGGTTAATTACAGGCAGACTTCAAAGCCT  
TCAAACCTATGTAACACAACAATAATCAGGGCTGCTGAAATC

FIG. 18B

HR-C peptides, HR-C1 to HR-C4

Nucleotide sequences for SARS peptides. The amino acid region is shown in brackets.

**HR-C1 (1147-1185)**

GATGTTGATCTTGGCGACATTTTCAGGCATTAACGCTTCTGTCGTCAACATTCAAAAAGAAAT  
TGACCGCCTCAATGAGGTCGCTAAAAATTTAAATGAATCACTCATTGACCTTCAAGAATTG

**HR-C2 (1165-1185)**

ATTGACCGCCTCAATGAGGTCGCTAAAAATTTAAATGAATCACTCATTGACCTTCAAGAATT  
G

**HR-C3 (1158-1185)**

GTCGTCAACATTCAAAAAGAAATTGACCGCCTCAATGAGGTCGCTAAAAATTTAAATGAATC  
ACTCATTGACCTTCAAGAATTG

**HR-C4 (1151-1185)**

ATTTTCAGGCATTAACGCTTCTGTCGTCAACATTCAAAAAGAAATTGACCGCCTCAATGAGGT  
CGCTAAAAATTTAAATGAATCACTCATTGACCTTCAAGAATTG

Amino acid sequence for SARS peptide HR-C1

**HR-C1 (1147-1185)**

DLGDISGINASVVNIQKEIDRLNEVAKNLNESLIDLQEL

**FIG. 19**

**HR-N**

Nucleotide sequences for SARS peptides. The amino acid region is shown in brackets.

**HR-N (882-1011)**

ATGCAAATGGCATATAGGTTCAATGGCATTGGAGTTACCCAAAATGTTCTCTATGAG  
AACCAAAAACAAATCGCCAACCAATTTAACAAGGCGATTAGTCAAATTCAAGAATCACTTAC  
AACAACATCAACTGCATTGGGCAAGCTGCAAGACGTTGTTAACCAGAATGCTCAAGCATTAA  
ACACACTTGTTAAACAACCTTAGCTCTAATTTTGGTGCAATTTCAAGTGTGCTAAATGATATC  
CTTTCGCGACTTGATAAAGTCGAGGCGGAGGTACAAATTGACAGGTTAATTACAGGCAGACT  
TCAAAGCCTTCAAACCTATGTAACACAACAATAATCAGGGCTGCTGAAATCAGGGCTTCTG  
CTAATCTTGCTGCTACTAAAATG

**FIG. 20**

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ATGTTTATTTTCTTATTATTTCTTACTCTCACTAGTGGTAGTGACCTTGACCGGTGCACCACTTTTGATG  
ATGTTCAAGCTCCTAATTACACTCAACATACTTCATCTATGAGGGGGGTTTACTATCCTGATGAAATTTT  
TAGATCAGACACTCTTTATTTAACTCAGGATTTATTTCTTCCATTTTATTCTAATGTTACAGGGTTTCAT  
ACTATTAATCATACGTTTGGCAACCCTGTCATACCTTTTAAGGATGGTATTTATTTTGCTGCCACAGAGA  
AATCAAATGTTGTCCGTGGTGGGTTTTTGGTTCTACCATGAACAACAAGTCACAGTCGGTGATTATTAT  
TAACAATTCTACTAATGTTGTTATACGAGCATGTAACCTTTGAATTGTGTGACAACCCTTTCTTTGCTGTT  
TCTAAACCCATGGGTACACAGACACATACTATGATATTCGATAATGCATTTAATTGCACTTTTCGAGTACA  
TATCTGATGCCTTTTCGCTTGATGTTTCAGAAAAGTCAGGTAATTTTAAACACTTACGAGAGTTTGTGTT  
TAAAAATAAAGATGGGTTTTCTCTATGTTTATAAGGGCTATCAACCTATAGATGTAGTTCGTGATCTACCT  
TCTGGTTTTAACACTTTGAAACCTATTTTTAAGTTGCCTCTTGGTATTAACATTACAAATTTTAGAGCCA  
TTCTTACAGCCTTTTACCTGCTCAAGACATTTGGGGCACGTCAGCTGCAGCCTATTTTGTGTTGGCTATTT  
AAAGCCAACACTACATTTATGCTCAAGTATGATGAAAATGGTACAATCACAGATGCTGTTGATTGTTCTCAA  
AATCCACTTGCTGAACTCAAATGCTCTGTTAAGAGCTTTGAGATTGACAAAGGAATTTACCAGACCTCTA  
ATTTCAGGGTTGTTCCCTCAGGAGATGTTGTGAGATTCCCTAATATTACAACTTGTGTCCTTTTGGAGA  
GGTTTTTAATGCTACTAAATTCCCTTCTGTCTATGCATGGGAGAGAAAAAAATTTCTAATTGTGTTGCT  
GATTACTCTGTGCTCTACAACCTCAACATTTTTTTTCAACCTTTAAGTGCTATGGCGTTTCTGCCACTAAGT  
TGAATGATCTTTGCTTCTCCAATGTCTATGCAGATTCTTTTGTAAGTCAAGGGAGATGATGTAAGACAAAT  
AGCGCCAGGACAACTGGTGTTATTGCTGATTATAATTATAAATTGCCAGATGATTTTCATGGGTGTGTC  
CTTGCTTGGAATACTAGGAACATTGATGCTACTTCAACTGGTAATTATAATTATAAATATAGGTATCTTA  
GACATGGCAAGCTTAGGCCCTTTGAGAGAGACATATCTAATGTGCCTTTCTCCCTGATGGCAAACCTTG  
CACCCACCTGCTCTTAATTGTTATTGGCCATTAAATGATTATGGTTTTTACACCACTACTGGCATTGGC  
TACCAACCTTACAGAGTTGTAGTACTTTCTTTTGAACCTTTTAAATGCACCGGCCACGGTTTGTGGACCAA  
AATTATCCACTGACCTTATTAAGAACCAGTGTGTCAATTTTAATTTTAATGGACTCACTGGTACTGGTGT  
GTTAACTCCTTCTTCAAAGAGATTTCAACCATTTCAACAATTTGGCCGTGATGTTTCTGATTTCACTGAT  
TCCGTTTCGAGATCCTAAAACATCTGAAATATTAGACATTTACCTTGCTCTTTTGGGGGTGTAAGTGTA  
TTACACCTGGAACAAATGCTTCATCTGAAGTTGCTGTTCTATATCAAGATGTTAACTGCACTGATGTTTC  
TACAGCAATTCATGCAGATCAACTCACACCAGCTTGGCGCATATATTCTACTGGAAACAATGTATTCCAG  
ACTCAAGCAGGCTGTCTTATAGGAGCTGAGCATGTCGACACTTCTTATGAGTGCGACATTCCCTATTGGAG  
CTGGCATTGTGCTAGTTACCATACAGTTTCTTTATTACGTAGTACTAGCCAAAAATCTATTGTGGCTTA  
TACTATGTCTTTAGGTGCTGATAGTTCAATTGCTTACTCTAATAACACCATTGCTATACCTACTAACTTT  
TCAATTAGCATTACTACAGAAGTAATGCCTGTTTCTATGGCTAAAACCTCCGTAGATTGTAATATGTACA  
TCTGCGGAGATTCTACTGAATGTGCTAATTTGCTTCTCCAATATGGTAGCTTTTGCACACAATAATCG  
TGCACCTCTCAGGTATTGCTGCTGAACAGGATCGCAACACACGCTGAAGTGTTTCGCTCAAGTCAAACAAATG  
TACAAAACCCCAACTTTGAAATATTTTGGTGGTTTTAATTTTTTCACAAATATTACCTGACCCTCTAAAGC  
CAACTAAGAGGTCTTTTATTGAGGACTTGCTCTTTAATAAGGTGACACTCGCTGATGCTGGCTTCATGAA  
GCAATATGGCGAATGCCTAGGTGATATTAATGCTAGAGATCTCATTTGTGCGCAGAAGTTCAATGGACTT  
ACAGTGTTGCCACCTCTGCTCACTGATGATATGATTGCTGCCTACACTGCTGCTCTAGTTAGTGGTACTG  
CCACTGCTGGATGGACATTTGGTGCTGGCGCTGCTCTTCAAATACCTTTTGCTATGCAAATGGCATATAG  
GTTCAATGGCATTGGAGTTACCCAAAATGTTCTCTATGAGAACCACAAAACAAATCGCCAACCAATTTAAC  
AAGGCGATTAGTCAAATTCAAGAATCACTTACAACAACATCAACTGCATTGGGCAAGCTGCAAGACGTTG  
TTAACCAGAATGCTCAAGCATTAAACACACTTGTTAAACAACCTTAGCTCTAATTTTGGTGCAATTTCAAG  
TGTGCTAAATGATATCCTTTTCGCGACTTGATAAAGTCGAGGCGGAGGTACAAATTGACAGGTTAATTACA  
GGCAGACTTCAAAGCCTTCAAACCTATGTAACACAACAACCTAATCAGGGCTGCTGAAATCAGGGCTTCTG  
CTAATCTTGCTGCTACTAAAATGTCTGAGTGTGTTCTTGGACAATCAAAAAGAGTTGACTTTTGTGGAAA  
GGGCTACCACCTTATGTCCTTCCCACAAGCAGCCCCGCATGGTGTGTTGTTCTTCTACATGTCACGTATGTG  
CCATCCCAGGAGAGGAACCTTACCACAGCGCCAGCAATTTGTCATGAAGGCAAAGCATACTTCCCTCGTG  
AAGGTGTTTTTGTGTTTAAATGGCACTTCTTGGTTTTATTACACAGAGGAACCTTCTTTTCTCCACAAATAAT  
TACTACAGACAATACATTTGTCTCAGGAAATTGTGATGTCGTTATTGGCATCATTAACAACACAGTTTAT  
GATCCTCTGCAACCTGAGCTCGACTCATTCAAAGAAGAGCTGGACAAGTACTTCAAAAATCATACATCAC  
CAGATGTTGATCTTGGCGACATTTTCAAGGCATTAACGCTTCTGTGTCGTCACATTCAAAAAGAAATTGACCG  
CCTCAATGAGGTCGCTAAAAATTTAAATGAATCACTCATTGACCTTCAAGAATTGGGAAAATATGAGCAA  
TATATTAAATGGCCTTGGTATGTTTGGCTCGGCTTCATTGCTGGACTAATTGCCATCGTCATGGTTACAA  
TCTTGCTTTGTTGCATGACTAGTTGTTGCAGTTGCCTCAAGGGTGCATGCTCTTGTGGTTCTTGCTGCAA  
GTTTGATGAGGATGACTCTGAGCCAGTTCTCAAGGGTGTCAAATTACATTACACATAA

FIG. 21



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**HR-C Native (SEQ ID NO:48).**

1150	1161	1171	1181
DISGINASVVN	IQKEIDRLNE	VAKNLNESLI	DLQEL
ga d a d	a d	a d a	d

**HR-C Analogue 1 (SEQ ID NO:67). Modulation of the “a” residue position**

1150	1161	1171	1181
DISGINASVVN	IQKEIDRLNE	V <u>I</u> KNLNESLI	DLQEL

**HR-C Analogue 2 (SEQ ID NO:68). Change of Helical propensity**

1150	1161	1171	1181
DISGINASVVN	IQKEI <u>A</u> RLNE	VAK <u>A</u> NLNESLI	DLQEL

**HR-C Analogue 3 (SEQ ID NO:69). Change of Helical propensity and modulation of “a” position**

1150	1161	1171	1181
DISGINASVVN	IQKEI <u>A</u> RLNE	V <u>I</u> K <u>A</u> NLNESLI	DLQEL

**HR-C Analogue 4 (SEQ ID NO:70). Change of Helical propensity**

1150	1161	1171	1181
DI <u>A</u> AINASV <u>A</u> N	IQKEI <u>A</u> RLNE	VAK <u>A</u> NLES <u>L</u> A	<u>A</u> LQ <u>A</u> L

**HR-C Analogue 5 (SEQ ID NO:71). Introduction of lactam**

1150	1161	1171	1181
DISGINASVVN	IQKEI <u>E</u> RLN <u>K</u>	VAKNLNESLI	DLQEL
	[ ]		

**HR-C Analogue 6 (SEQ ID NO:72). Introduction of salt bridge**

1150	1161	1171	1181
DISGINASVVN	IQKEI <u>E</u> RLN <u>K</u>	VAKNLNESLI	DLQEL

**HR-C Analogue 7 (SEQ ID NO:73).**

1150	1161	1171	1181
DI <u>E</u> EIN <u>K</u> KV <u>E</u> E	IQ <u>K</u> KIE <u>E</u> LN <u>K</u>	<u>K</u> A <u>E</u> ELN <u>K</u> K <u>L</u> E	<u>E</u> LQ <u>K</u> K

**HR-C Analogue 8 (SEQ ID NO:74). Introduction of salt bridges**

1150	1161	1171	1181
DISGINASV <u>V</u> E	IQ <u>K</u> KIE <u>E</u> LN <u>K</u>	<u>K</u> A <u>E</u> ELN <u>K</u> K <u>L</u> I	DLQEL

FIG. 22